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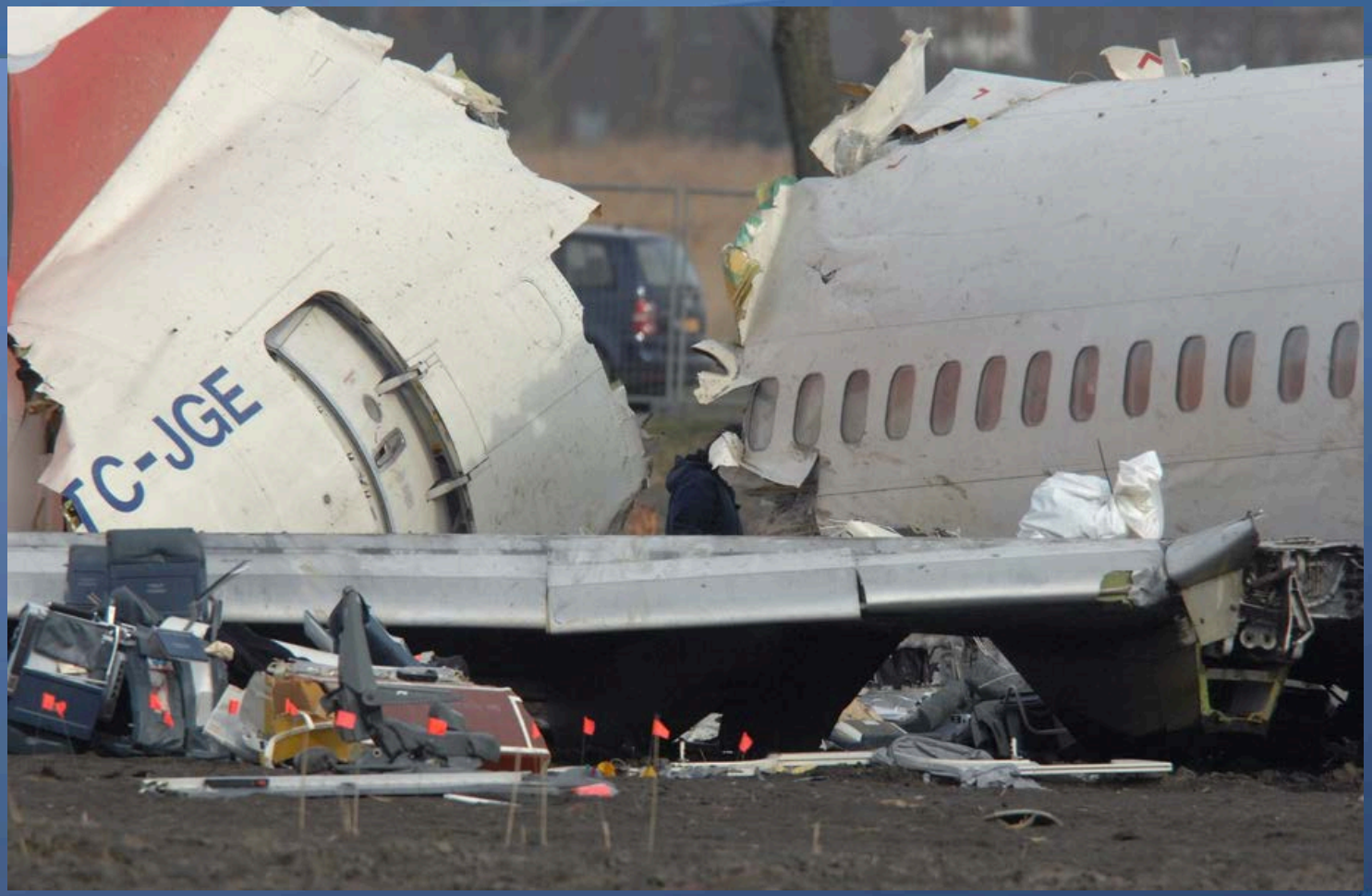
# Runway Incursions-Excursions-Runway Confusion




## Systemic Safety

YEARS

# Runway Incursion

ICAO: Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designed for the landing and take-off of an aircraft. In general they are caused by:

- ✓Poor communication
- ✓Poor Aviation English
- ✓Loss of situational awareness

YEARS

# Runway Confusion

Runway confusion is where pilots enter, take off on land on an incorrect runway or mistake a taxiway for a runway.


- ✓Poor communication
- ✓Loss of situational awareness
- ✓Poor signage
- ✓Poor or incorrect use of airfield lighting

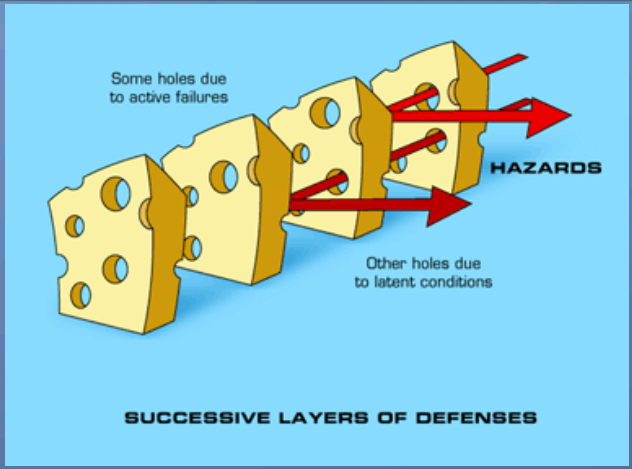
# Runway Excursion

A runway excursion is an event in which an aircraft veers off or overruns the runway surface during either take-off or landing. Many factors can contribute to an excursion:

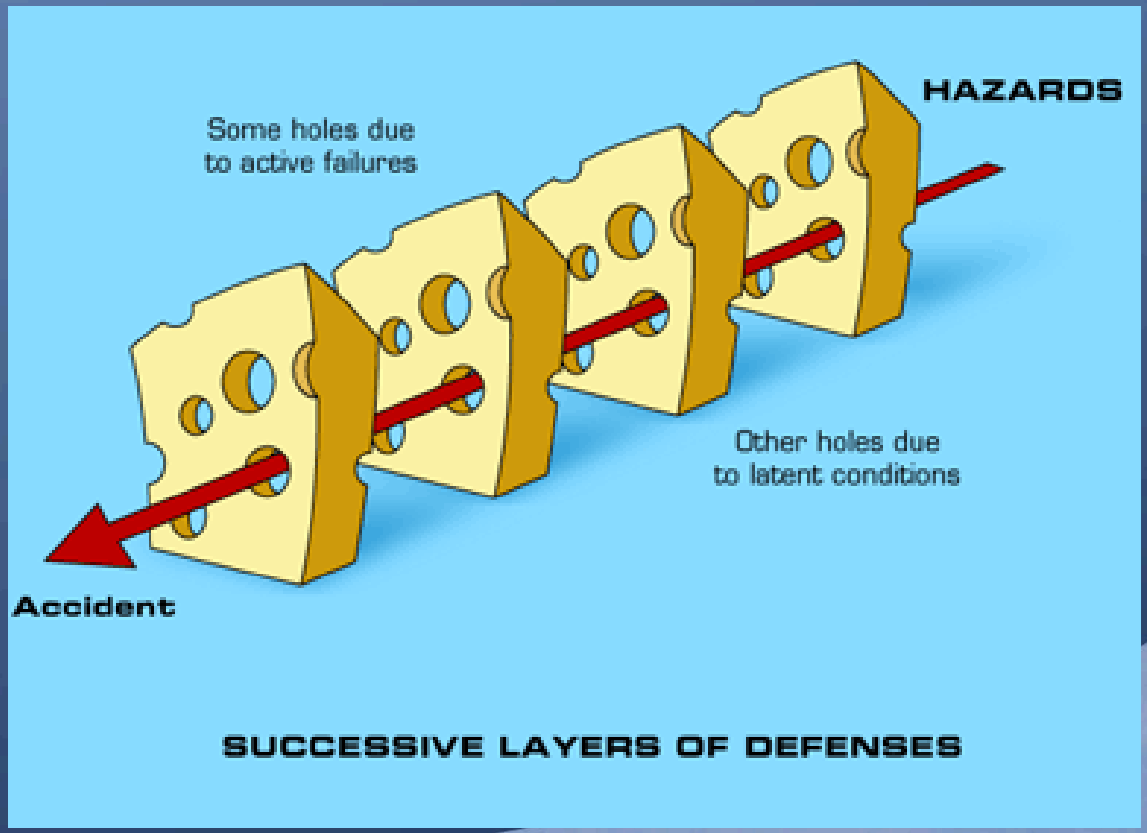
- ✓ Runway contamination
- ✓Adverse weather
- ✓Mechanical failure
- ✓Pilot error
- ✓Unstable approaches
- ✓No safeguarding
- ✓Non compliance with procedures

# Hazards Analysis

# Linear Approach to Safety




## James Reason's "cheese model"



# So Does Linear Work?

# Findings

- ✓Crew did not apply standard PF/PM monitor
- ✓Crew did not positively verify the runway
- ✓Aeroflot had no no SOP for the crew to positively confirm location before take-off
- ✓Norwegian CAA contravened ICAO standards
- ✓Air Port Authority considered a hot spot declaration
- ✓ATC failed to monitor the take-off of the aircraft

# SUCCESS OR FAILURE

is determined by the outcome

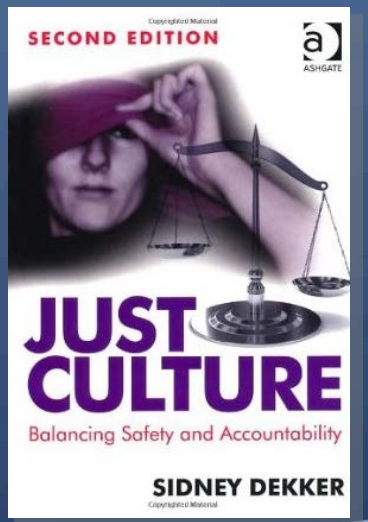
HERO
US-Airways A320
Hudson River/New York

VILLAIN
Air France A330
South Atlantic

# Linear Approach to Safety

Learning from accidents & incidents


'Just culture' to collect more information about incidents



# Turkish Airlines Amsterdam February 2009

# Turkish Airlines Amsterdam

- ✓**ATC vectored a/c high and fast for ILS**
- ✓ Vref 144Kts
- ✓Autopilots/ATHR disengaged 2000 ft
- ✓1 radar ALT fails , (-8 ft) + ATHR retard
- ✓1000 ft : 126 Kts ; speed + pitch warnings
- ✓450 ft : stall warning + stick shaker
- ✓350 ft : a/c stalled . Not recovered
- ✓**Report : Crew did not recognize speed decay**

# Asiana B777 San Francisco July 2013

# Asiana B777 San Fancisco

- ✓**ATC vectored a/c high and fast  Visual APP**
- ✓Vref 137 Kts
- ✓1600 Ft Autopilot disengaged ATHR armed
- ✓500 ft =134 Kts +speed warning
- ✓200 ft  =118Kts  stick shaker +stall warning
- ✓125 Ft = 112 Kts + crew increased pitch
- ✓Runway threshold 103 Kts
- ✓**NTSB : CREW did not recognize speed decay**

# Singapore Airlines B744 October 2000

Boeing 747-400 being operated by Singapore Airlines on a scheduled passenger flight from Taipei,  to Los Angeles commenced take off on a partially closed runway in reduced (but not low) visibility instead of the correct runway without ATC being aware of the error.

# China Airlines January 2002

In VMC at night, an Airbus A340-300 being operated by China Airlines successfully took-off from a parallel taxiway adjacent to the departure runway at Anchorage Alaska which was of less length than the calculated take-off distance required.

# Finair November 2010

At night in VMC an Finair A340 attempted a take-off on Parellel taxiway Alpha adjacnet to the intended RWY 07L

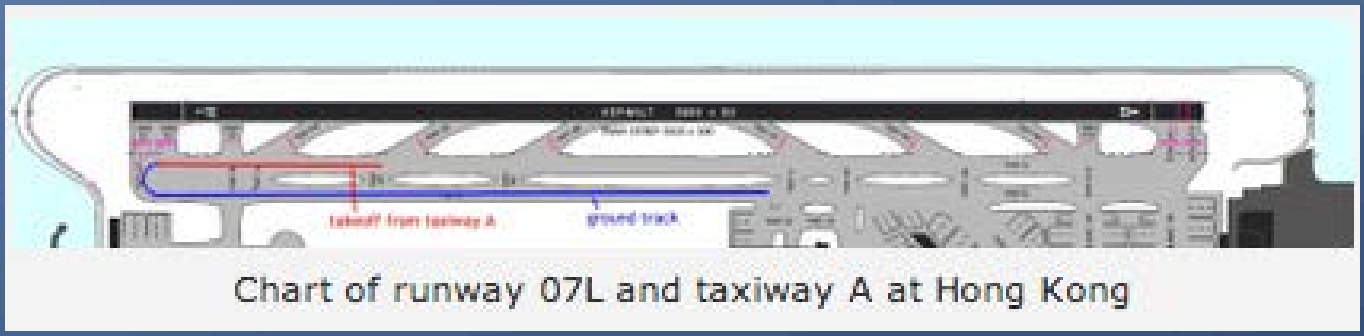
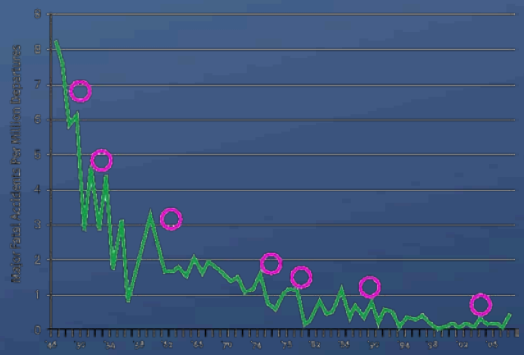



Chart of runway 07L and taxiway A at Hong Kong

# Today's Challenge

Optimizing safety around $10^{-7}$ requires us to think of new philosophies, methods and tools.

The current method seems to have reached its limits and we approach the asymptote.



# TODAY Linear approach ...

Tires

Chain

Brakes

# .... with increased complexity

Environment

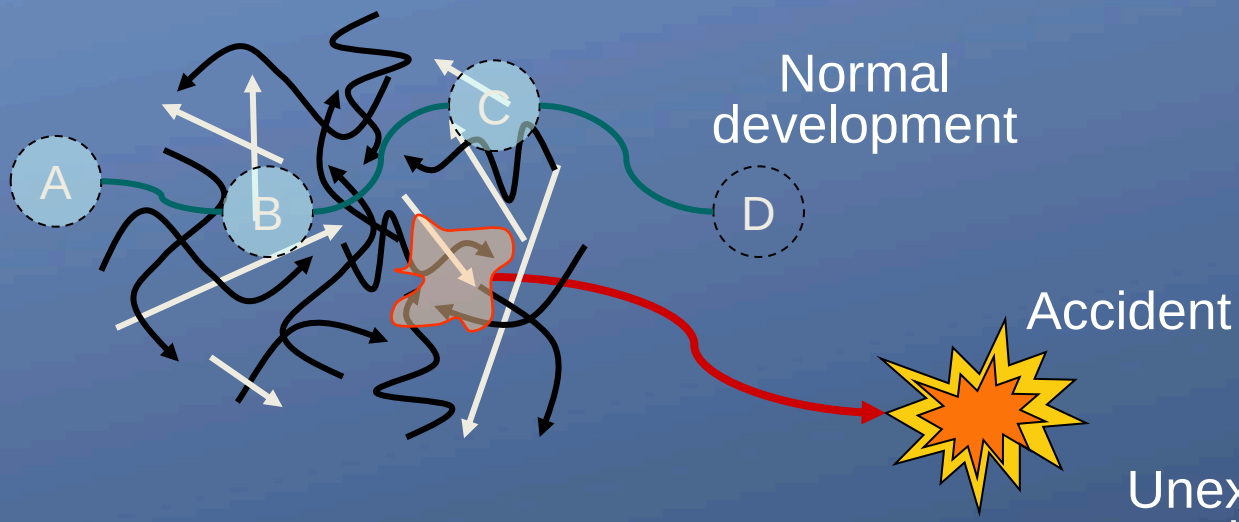
Road condition

Time pressure

# NEW Systemic approach ?

A single failure no longer explains the failure of the whole system.

# Systemic Model




$10^{-8}$ ?

**Consequence:**
Safety requires constant ability to anticipate future events.

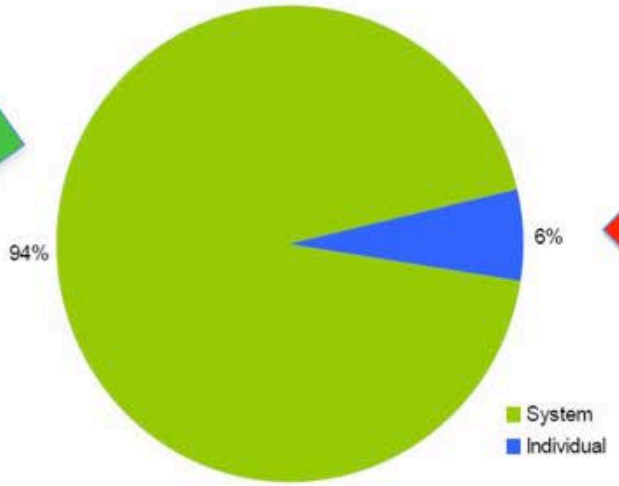
Erik Hollnagel, 2005

# Focussing on the wrong things?

We need to look at the 94%

We tend to focus on the 6%

## Individual or System Behaviour?




"I should estimate that in my experience most troubles and most possibilities for improvement add up to the proportions something like this: 94% belongs to the system (responsibility of management), 6% special."
Dr. W. Edwards Deming, "Out of the Crisis"

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# Resilience and a new Safety Approach

## Do we have the right model to learn from past and future events?

Author Tom Laursen and Anthony Smoker
IFATCA conference, Bali 2013
And ERM 2013, Sarajevo

# Focus on positive rather than negative

Individuals perform 30% better when positive than whe
neutral or stressed

- ✓Faster and more accurate decision making
- ✓Increased efficiency
- ✓Better decision making
- ✓More creativity
- ✓More resilience
- ✓Less burnout

Lyubomirsky, 2005

# Systemic Models

- ✓ The systemic approach requires us to understand the system as a whole instead of by its parts
- ✓ Failure and success stem from the same sources
- ✓ Accidents and incidents are explained by unexpected co-incidences and necessary variability within the system
- ✓ There is no or little separation of humans, technology, organisations and society.

# Systemic Models

- ✓ We change the goal from ”avoiding that anything goes wrong” to ”ensuring that everything goes right”
- ✓ Systemic models accept that systems are intractable rather than tractable (software engineers)
- ✓ Humans can develop strategies that can overcome intractability and their ability to adjust under varying conditions is a strength rather than a threat

# The individual explanation model

- ✓ The world consists of autonomic individuals that have complete authority over their actions
- ✓ Focus on personality
- ✓ He always take chances, he is not the sharpest person, he always reacts defensively, he is very clever, he is weak, he is happy and dynamic, he is a good controller, etc.
- ✓ Personality is very difficult to change
- ✓ Personality controls behaviour

# Relationship: explanation model

- ✓ Personality is constructed through social interaction
- ✓ Events and actions are part of larger relations and can't be understood in isolation
- ✓ No action without context, no training without a student and instructor in some form
- ✓ Individuals are always members of different groups and have different obligations and loyalties
- ✓ Social layers, ATCOs, Supervisors, APP controllers, Political parties, etc.
- ✓ A consequence is that a system can be understood as a whole not by the sum of it's parts

# Consequences

| | *Linear* | *Systemic* |
|---|---|---|
| **Role of the individual** | Victim of circumstances who gets blamed for getting into them | Empowered employee able to contribute meaningfully to organisational safety |
| **Role of manager/staff** | Manager must hear from reporter where s/he went wrong and why and managers can be blamed themselves | Manager and staff focus on contextual improvement |
| **Mechanism for getting at source of risk** | Line organization helps reporter understand that s/he was major source of risk | Reporter helps organisation understand where sources of risk lie in the operation |

# Consequences

| | *Linear* | *Systemic* |
|---|---|---|
| **Organisational tool for safety-measurement and reward-systems** | Number of incidents with separation breach | Investment in safety improving activites, e.g. change of working conditions, prediction, cism, etc. |
| **Organisational focus** | More training, technology and procedures will solve problems | Occupied with learning. You are never sure and you are never done |
| **Responsibility** | "Safe you own back" and "tick in the box" | Prospecive accountabilty that invites individuals to tell their story |
| **Language** | Causes and personal shortcomings (situational awareness, poor airmanship, etc.) | language of understanding and explanation that help us dig deeper. |

# From linear towards systemic

- ✓ It takes teamwork (humans, organizations, technology and society) to succeed as well as it takes teamwork to fail. Air traffic control is not about heroes and anti-heroes
- ✓ Safety reporting becomes less relevant to enhance safety (micro vs. macro)
- ✓ More emphasis on understanding processes and predicting what goes right
- ✓ It is about finding the right balance between linear and systemic models

**Systemic**

Macro understanding of patterns

Exploring patterns

Motives

How do others experience the situation

Conspiracy

**Individual**

**Relational**

Causes

Multiple Causes

Personality

Organizational responsibility

From, What is the cause to, Who is to blame

**Linear**

YEARS

# Relational explanation model

- ✓ Personality is constructed through social interaction
- ✓ Events and actions are part of larger relations and can't be understood in isolation
- ✓ No action without context, no training without a student and instructor in some form
- ✓ Individuals are always members of different groups and have different obligations and loyalties
- ✓ Social layers, ATCOs, Supervisors, APP controllers, Political parties, etc.
- ✓ A consequence is that a system can't be understood as a sum of its parts, but only as a whole

# Training as in an investment not a cost

*"You'll remember the quality long after you've Forgotten the cost"* Pierre Cardin

Aircrew and ATC refresher training is continually being pared to the absolute minimum.

With automation reducing manual skill levels of both professions, the reverse should be occurring.

Constant exposure to teamwork during unusual circumstances should be a byproduct of increased productivity of each individual.

# The difference is in the training

- ✓ Better training = better safety
- ✓ Cost too much ? =Consider the cost of accident
- ✓ Training not a cost = INVESTMENT
- ✓ Joint pilot-controllers training
- ✓ Solution also in change of methods we use to improve safety

# Conclusion

- ✓ We need both models to proceed, but to consider which model to use and when
- ✓ Systemic safety can help us achieve higher levels of reliability
- ✓ From $10^{-7}$ towards $10^{-8}$ and higher


On Behalf of IFATCA representing over 50,000 of my fellow Controllers In 134 countries

Thank you for your attention

YEARS